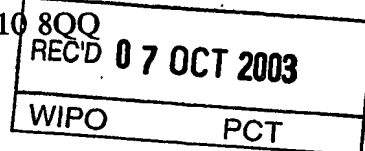




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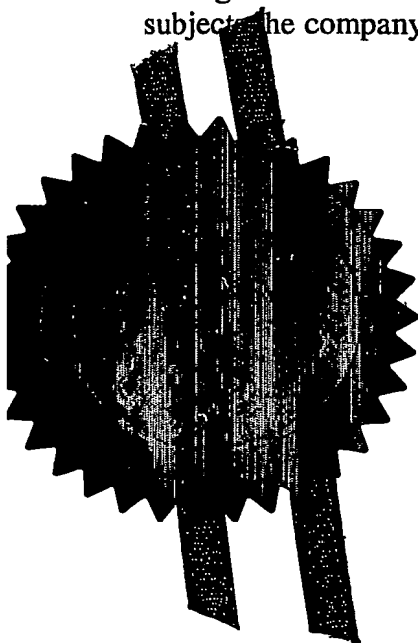


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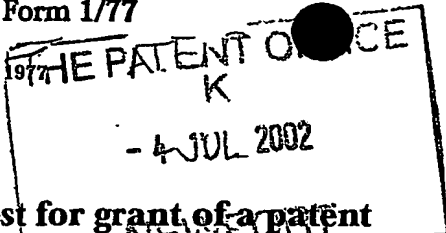
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1. Your reference

FB05642/MOC/AW

2. Patent application number

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0215419.3

04 JUL 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

MO TEAM Limited
25 Aghnadarragh Road
CRUMLIN
BT29 4QQ
Northern Ireland

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

8417610001

4. Title of the invention "ADisc Handling Apparatus and Method"

OBJECT
Promotion
27-6-02

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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Belfast
BT7 1FY
Northern Ireland
United Kingdom

Patents ADP number (if you know it)

7774417001

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Country

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Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

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- a) any applicant named in part 3 is not an inventor, or
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11. I/We request the grant of a patent on the basis of this application.

Signature *Brian O'Neill*
MO TEAM LIMITED

Date 29-6-02

12. Name and daytime telephone number of person to contact in the United Kingdom Brian O'Neill - 028 9023 6000

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An Object Handling Apparatus and Method

The present invention concerns a object handling apparatus and method, and in particular an object
5 handling apparatus and method adapted to stack and/or unload objects such as discs having an aperture therein defining an inner rim, such as compact discs, dvd's, floppy discs, etc.

10 The present invention therefore provides, in a first aspect, an object handling method for use with objects having an aperture therein defining an inner rim, the method comprising the sequential steps, in forward or reverse order, of; providing an arm, and providing a
15 support proximal to the arm; extending the arm, in a first plane, through the aperture of at least one object; extending the arm in a second plane substantially perpendicular to the first plane, such as to engage the inner rim of the object; retracting the
20 arm in the first plane, such as to draw the aperture around the support; and retracting the arm in the second direction, such that the object is engaged by the support.

25 Preferably, the method comprises providing the arm as a first set of jaws moveable relative to one another; providing the support as a second set of jaws moveable relative to one another and the first set of jaws; in extending the arm in the second plane, advancing the
30 first set of jaws away from one another such as to engage the inner rim at two points; following retraction of the arm in the first plane, advancing the second set of jaws away from one another, such as to

engage the inner rim at two points; and in retracting the arm in the second direction, advancing the first set of jaws towards one another, such as to disengage the inner rim.

5

Preferably, the method comprises providing a plurality of indentations spaces apart along the length of the arm.

- 10 Preferably, the method further comprises providing a plurality of indentations spaced apart along the length of the support.

According to a second aspect of the present invention
15 there is provided an apparatus adapted to perform the method according to the first aspect of the invention, the apparatus comprising a support on which, in use, one or more objects may be stacked on and/or unloaded from; an arm located parallel and proximal to the
20 support; and control circuitry adapted to effect the steps of the method according to the first aspect of the invention.

Preferably, the arm is provided with a plurality of
25 indentations spaced apart along the length thereof.

Preferably, the support is provided with a plurality of indentations spaced apart along the length thereof.

- 30 Preferably, the apparatus is provided with a sensor which is adapted to detect when a preset number of discs have been stacked on the support.

The present invention will now be described with reference to the accompanying drawings, in which;

Figure 1 (A)-(E) illustrates a side elevation,
5 accompanied by an end view, of the five sequential operations of a first embodiment of an apparatus according to the present invention, in stacking an apertured disc onto the apparatus;

10 Figure 2 (A)-(E) illustrates a side elevation, accompanied by an end view, of the five sequential operations of the apparatus of Figure 1 in stacking a second apertured disc on the apparatus;

15 Figure 3 (A)-(E) illustrates a side elevation, accompanied by an end view, of the five sequential operations of a second embodiment of an apparatus according to the present invention, in stacking an apertured disc onto the apparatus; and

20 Figure 4 (A)-(E) illustrates a side elevation, accompanied by an end view, of the five sequential operations of the apparatus of Figure 3 in stacking a second apertured disc onto the apparatus.

25 Referring then to figures 1 and 2 of the accompanying drawings, there is illustrated a first embodiment of an object handling apparatus, generally indicated as 10, onto which, in use, one or more apertured objects such
30 as discs 12 may be stacked onto and/or unloaded from. The apparatus 10 is primarily intended to be used in a substantially horizontally disposed orientation. The purpose of the apparatus 10 is to pick up and stack one

or more of the discs 12, which in practice will take the form of articles such as CD's, DVD's, computer discs, etc, (not shown). The apparatus 10 is primarily intended to form an integral component of an assembly line (not shown), and may be articulated to move the discs 12 stacked thereon from one located to another, and to then unload the discs 12 as required, and as will be described in greater detail hereinafter.

10 The apparatus 10 primarily comprises an elongate support 16 on which, in use, the discs 12 are stacked onto and/or unloaded from. The support 16 includes a plurality of indentations in the form of grooves 22
15 equally spaced from one another along the length of the support 16, into each of which grooves 22 a single disc 12 may be seated, as will be described in greater detail hereinafter. The apparatus 10, further
20 comprises an elongate arm 18 which is adapted, again as will be described in detail herein after, to retrieve a disc 12 from a given location and stack said disc 12 onto the support 16. The arm 18 includes a plurality of indentations 24 within each of which a single disc 12 is seated during transport onto or off the support 16. The support 16 and arm 18 are disposed in parallel
25 relation to one another, the arm 18 being moveable relative to the support 16. Specifically, the support 16 is provided with a centrally disposed channel 20 therein, within and about which the arm 18 is moveable. In the embodiment illustrated, the support 16 is
30 mounted to a body 26, within which is located a base 28 to which the arm 18 is mounted. The base 28 is moveable within the body 26, by any conventional means,

such as hydraulics or the like, such as to effect movement of the arm 18 relative to the support 16.

Therefore, referring to figure 1(A), the apparatus 10
5 is located such that the contiguous free ends of the support 16 and arm 18 are located proximal a first disc 12, and in particular the apparatus 10 is located such that the support 16 and the arm 18 are aligned with an aperture 14 in the disc 12. In this initial state the
10 arm 18 is fully recessed within the channel 20. Referring then to figure 1(B), the arm 18 is extended through the aperture 14 such that the first indentation 24 is coplanar with the disc 12. Referring then to figure 1(C), the arm 18 is raised upwardly out of the
15 channel 20, thereby engaging the disc 12 within the first indentation 24, such as to pick the disc up from its rest position. Continuing on to figure 1(D), the arm 18, while remaining out of the channel 20, is retracted such as to effectively draw the support 16
20 through the aperture 14, until the disc 12 is aligned with the first groove 22 on the support 16. Turning then to figure 1(E), the arm 18 is dropped back into the channel 20, thereby lowering the disc 12 into engagement with the first groove 22. Once the arm 18
25 is fully retracted within the channel 20, the disc 12 is fully disengaged there from. In order to ensure that sufficient stability is provided to the disc 12 while stacked on the apparatus 10, the upper surface of the support 16, in addition to the plurality of grooves
30 22, is preferably accurate such as to contact a substantial portion of the disc 12 about the aperture 14.

In order to stack a second disc 12' and subsequent discs onto the support 16, the above sequential steps are repeated for each disc 12 to be stacked, until the desired number of discs are located on the support 16, or until each groove 22 on the support 16 has been filled. Thus, referring to figure 2(A)-(E), the apparatus 10 is illustrated with a first disc 12 seated within the first groove 22 of the support 16, and the second disc 12' being retrieved and stacked onto the support 16. Figure 2(A) shows the arm 18 being extended through the aperture 14 of the second disc 12'. Figure 2(B) illustrates the arm 18 being raised such as to pick up the second disc 12'. However, in raising the arm 18, it can be seen that the first disc 12 is also raised out of the respective groove 22 and is therefore also supported entirely by the arm 18. Referring then to figure 2(C), the arm 18 is retracted with the first and second discs 12, 12' therefore being drawn rearwardly relative to the support 16.

Referring then to figure 2(D), the arm 18 is lowered into the channel 20, thereby resulting in the first and second discs 12, 12' each being lowered into a respective groove 22 on the support 16. Referring to figure 2(E), the above sequence may then be repeated by again extending the arm 18 such as to retrieve a third disc 12''. It will therefore be appreciated that as the above sequence is repeated, the plurality of discs 12 will be simultaneously moved rearwardly along the support 16, one groove 22 at a time, towards the body 26. The apparatus 10 is therefore provided with a sensor 30 mounted to the body 26, which sensor 30 is adapted to detect when the final groove 22 on the

support 16 has been filled with a disc 12, thereby indicating that all of the grooves 22 on the support 16 have been filled. Thus the sensor 30 is adapted to generate a signal which may terminate operation of the apparatus 10, generate a signal to which an operator responds, or displace the apparatus 10 to a new location within the assembly line (not shown). At any point during stacking of the apparatus 10 with discs 12, the above sequences may be reversed in order to unload the discs 12 from the apparatus 10 to any given location.

It will however be appreciated from the foregoing description that the discs 12 remain suspended in position on the support 16 under the influence of gravity, and thus the apparatus 10 is only suited for use in a horizontal orientation.

Referring then to figures 3 and 4 of the accompanying drawings, there is illustrated a second embodiment of an object handling apparatus, generally indicated as 110, for use in stacking and/or unloading objects such as discs 112 from an off horizontal, preferably vertical, orientation. In the second embodiment like components have been accorded like reference numerals, and unless otherwise stated, perform a like function. Thus the apparatus 110 essentially comprises a support in the form of a first pair of jaws 116, and an arm in the form of a second pair of jaws 118 located in parallel spaced relation to the first jaws 116. The first jaws 116 are mounted to a body 126, while the second jaws 118 are mounted to a base 128 disposed within the body 126. Referring to figure 3(A), the

apparatus 110 is located such that the free ends of the first jaws 116 and second jaws 118 are located proximal an aperture 114 of the disc 112 to be stacked. Turning then to figure 3(B), the second jaws 118 are extended
5 downwardly such as to pass through the aperture 114 until a first set of indentations 124 are disposed coplanar with the disc 112. Referring then to figure 3(C), the second jaws 118 are then advanced away from one another such as to engage the disc 112 about the
10 aperture 114, at a pair of oppositely disposed points. The second jaws 118 are then retracted such as to effectively draw the first jaws 118 through the aperture 114 of the disc 112. Referring to figure 3(E), the first jaws 116 are then advanced away from
15 one another such as to engage the disc 112 about the aperture 114. The second jaws 118 may then be advanced towards one another such as to disengage the disc 112, which is then supported solely by the first jaws 116.

20 Turning then to figure 4, the above sequence may then be repeated to stack a second disc 112' and subsequent discs. Thus referring to figure 4(A), with the first disc 112 retained by the first jaws 116, the second jaws 118 are advanced through the aperture 114 of the
25 second disc 112'. Turning then to figure 4(B), the second jaws 118 are then advanced away from one another such as to engage both the first and second discs 112, 112'. The first jaws 116 are then advanced towards one another such as to disengage the first disc 112.

30 Turning to figure 4(C), the second jaws 118 are then retracted such as to draw the second disc 112' over the first jaws 116. This retraction of the second jaws 118 also draws the first disc 112 further along the first

jaws 116. Referring to figure 4(D), the first jaws 116 are then advanced away from one another such as to engage both the first and second disc 112, 112', wherein the second jaws 118 are advanced towards one another such as to disengage the first and second discs 112, 112'. Thus the first and second discs 112, 112' are each engaged in a respective groove 122 of each of the first jaws 116, such as to retain the discs 112, 112' stacked in position on the apparatus 110. Again, referring to figure 4(E), the above sequence may then be repeated to stack further discs 112 onto the apparatus 110, each sequence advancing the plurality of discs 112 upwardly along the first jaws 116. The apparatus 110 is also provided with a sensor 130, mounted to the body 126 and located proximal the final grooves 22 on the first jaws 116, such as to detect the presence of a disc 112 in said grooves 22, and thus generating an appropriate signal.

It will be appreciated that while the apparatus 110 is primarily intended to vertically stack discs 112, it could of course be applied to discs (not shown) in any orientation, including horizontal.

The present invention is not limited to the embodiments described herein, which may be amended or modified without departing from the scope of the present invention.

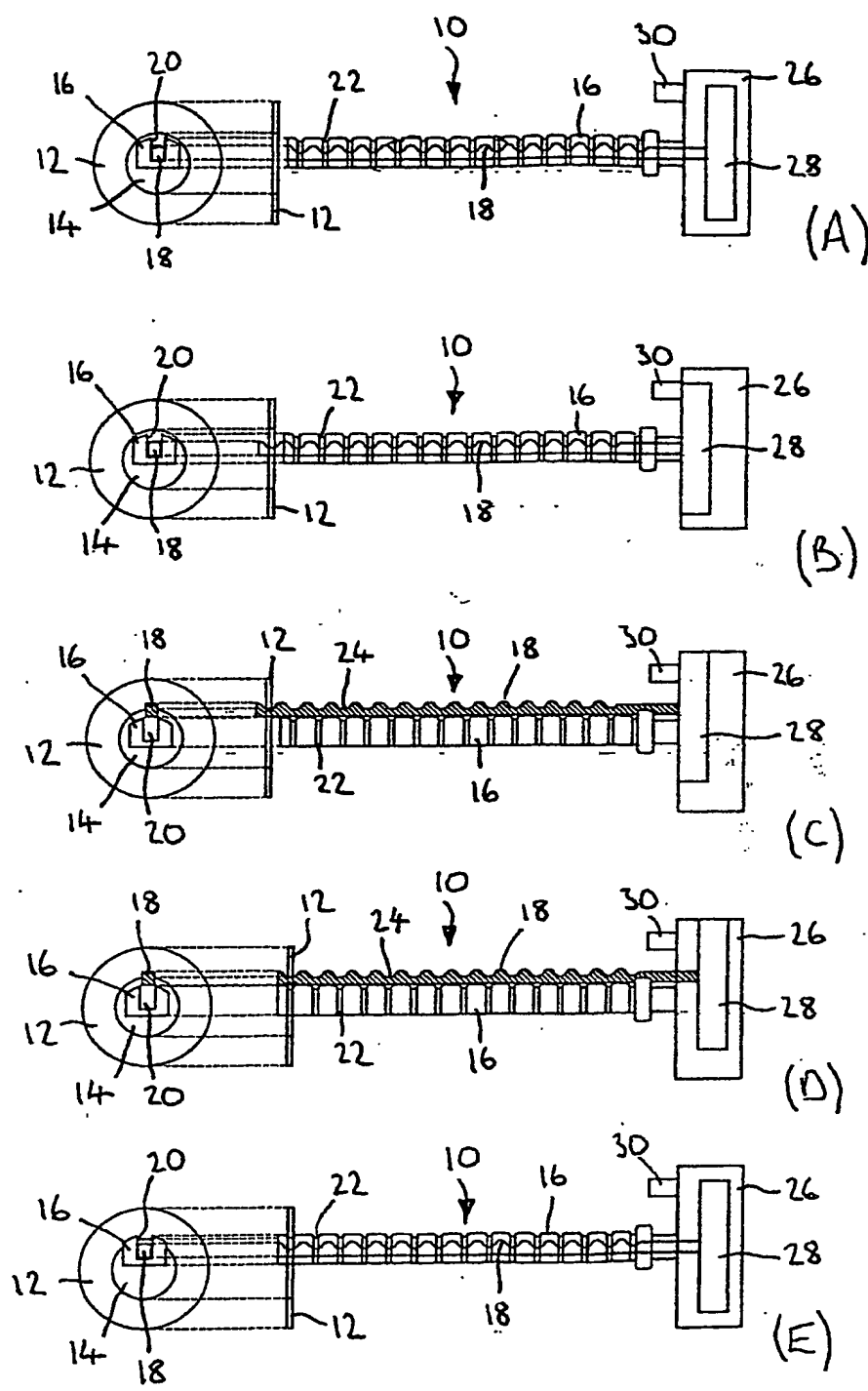


FIG. 1

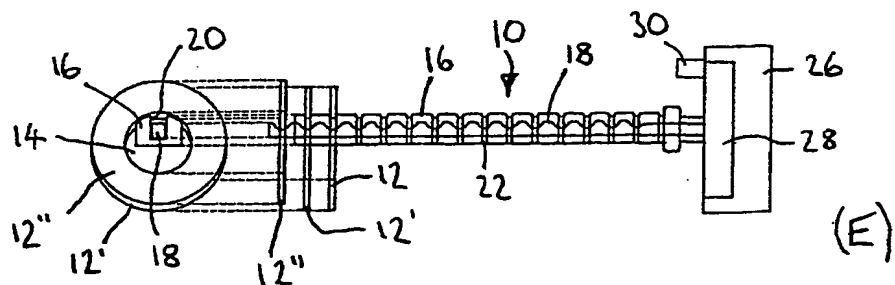
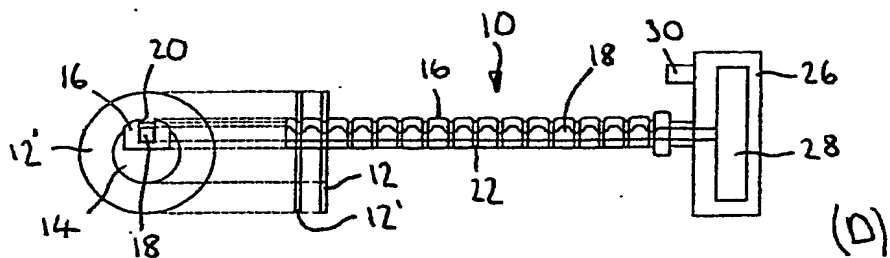
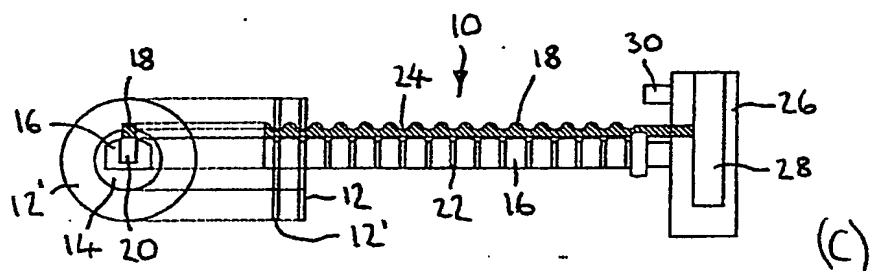
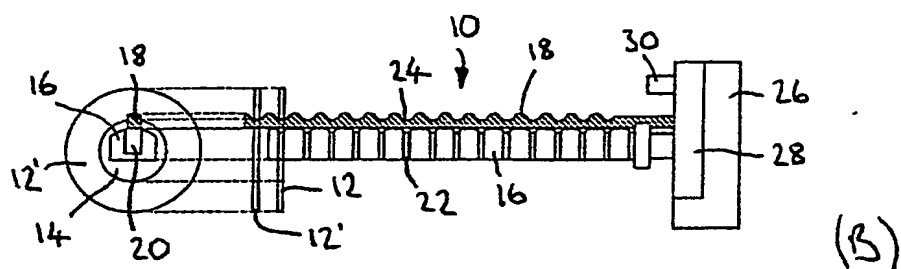
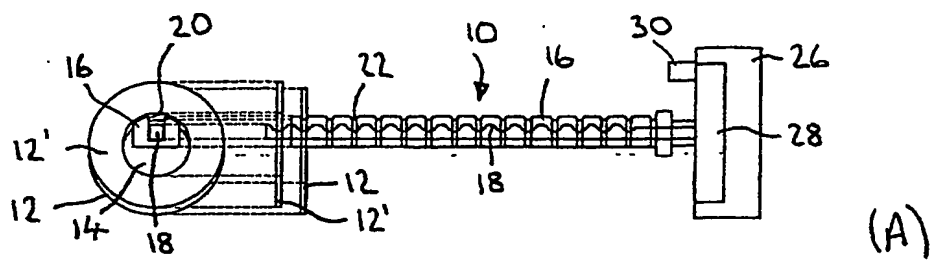
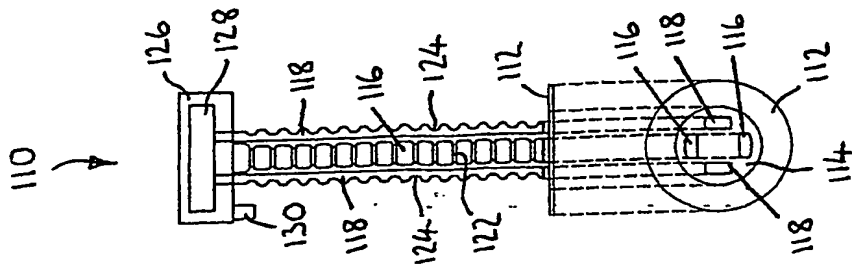
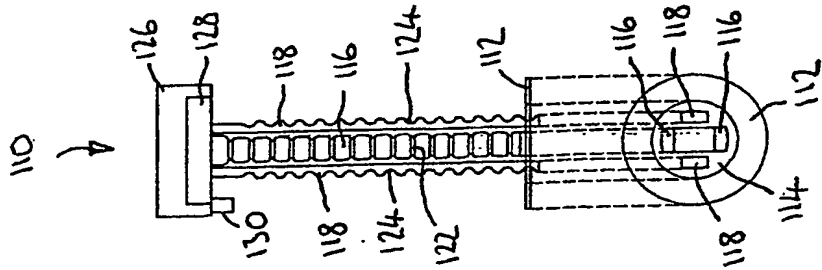


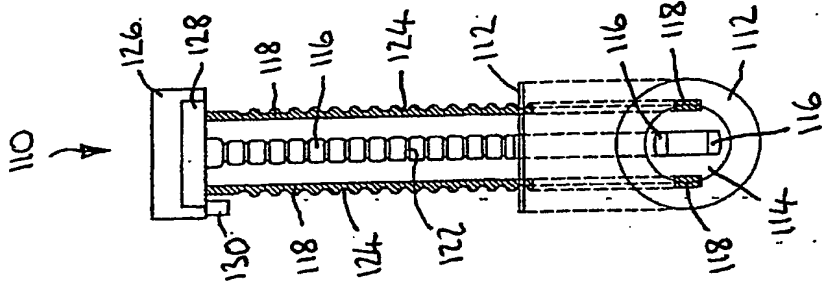
FIG. 2



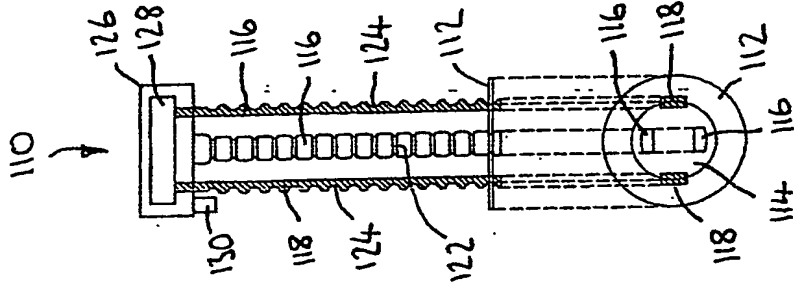
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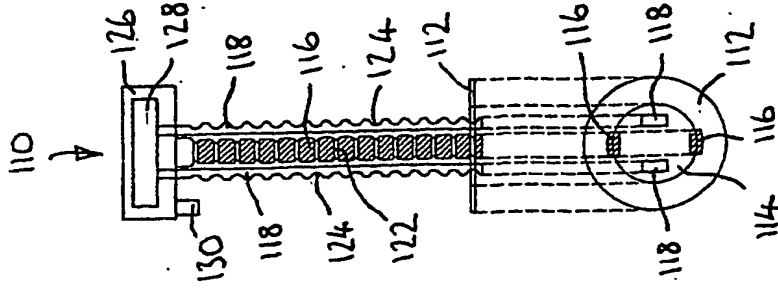
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(C)

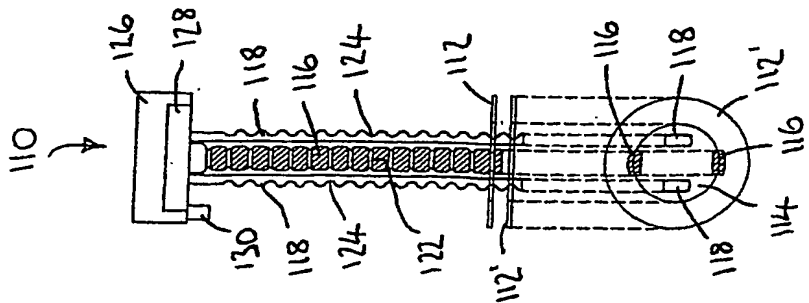


(D)

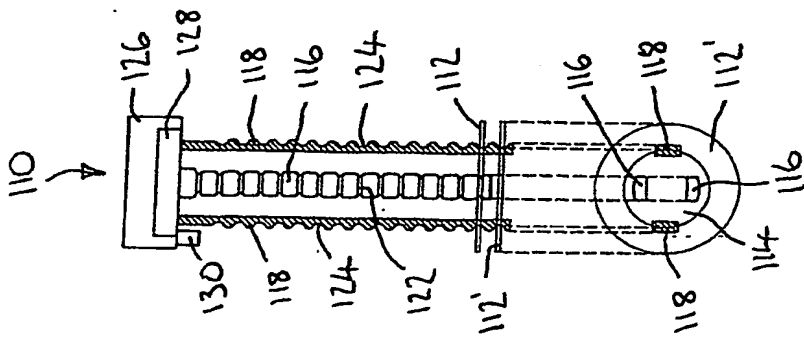


(E)

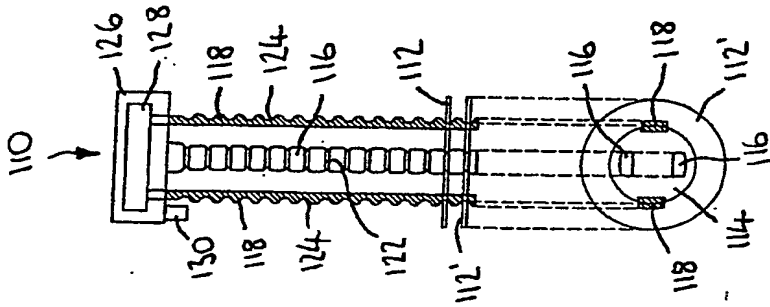
FIG. 3



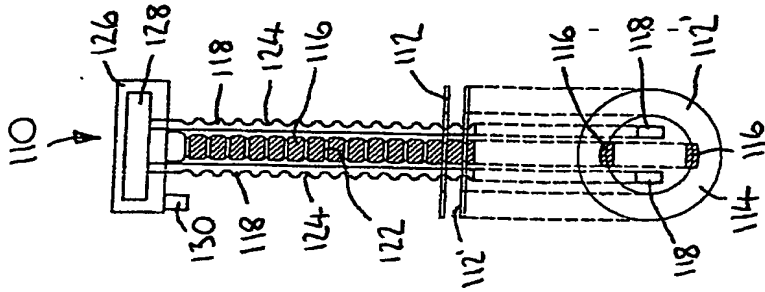
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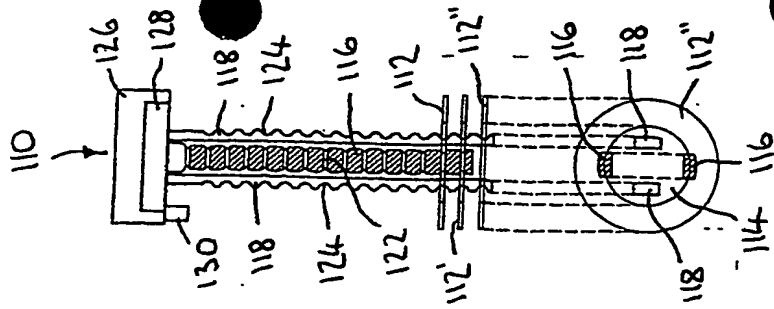
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(C)



(D)



(E)

FIG. 4

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